

REMARKS

The foregoing amendments and the following remarks are made in response to the Office Action (hereinafter "the Action") dated April 27, 2007. The above-identified patent application was filed September 19, 2003 with claims 1-19. The Examiner issued a restriction requirement dated December 28, 2005. Claims 1-13 were elected on January 27, 2006. The Examiner then issued an Office Action dated April 7, 2006 in which the Examiner rejected claims 1-3 and 6-13 under 35 U.S.C. §103 and indicated that claims 4, 5 and 14-19 were withdrawn.

Claims 1-3 and 6-13 are pending in this application. Claims 1 and 3 are currently amended. In view of the amendment to claim 1 and arguments set forth below, claims 1-3 and 6-13 are allowable, and the Examiner is respectfully requested to withdraw the rejections and issue a Notice of Allowance.

I. SUMMARY OF INTERVIEW

A brief interview was conducted between an Advocate for the Applicant and the Examiner on May 30, 2007. The discussion was directed to amending the claims to reflect the manner of contacting the substrate to be metallized in a manner that the silver salt solution has Na₄EDTA present and to the extent to which this limitation is supported in the specification. The Examiner indicated that such an amended claim is potentially patentable. Claim 1 has been amended to indicate the supported method for metallization in a bath which

contains the silver salt and the Na₄EDTA. Also discussed was the mode of scouring the substrate prior to premetallization. No conclusion was reached regarding the novelty of the scouring method.

II. CLAIM REJECTIONS UNDER 35 USC §103

6. The Examiner rejected claims 1-2 and 6-13 under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,302,415 to *Gabara et al.* in view of United States Patent No. 4,204,013 to *Arscilesi et al.* and in view of United States Patent No. 4,716,055 to *Sanders et al.* The Examiner stated that *Gabara et al.* discloses the elements of the claimed invention recited in claim 1 except for contacting the pre-metallized organic substrate with Na₄EDTA before placing the substrate into the electroless silver bath and a scouring step. The Examiner stated that *Arscilesi et al.* discloses use of a Na₄EDTA treatment prior to electroless plating plastic substrates and after sensitization in a stannous chloride solution acts to accelerate the deposition during the electroless process and make the substrate more receptive to electroless plating. The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify *Gabara et al.* to include an acceleration step as disclosed by *Arscilesi et al.* with an expectation that this step would accelerate the electroless deposition and make the substrate more receptive to the plating process. The Examiner also stated that *Sanders et al.* discloses a process where an organic substrate, a fiber, is scoured prior to etching and concluded that it

would be obvious to further combine the step of scouring in *Sanders et al.* with the process of *Gabara et al.* and the acceleration step of *Arcilesi et al.* to arrive at the present invention.

Claim 1 has been amended, as supported in paragraph [0022] of the present invention, with the respect to the use of Na₂EDTA in the method to recite:

An improved method for plating an organic substrate with silver, which comprises:

- (a) scouring the organic substrate to prepare the surface for pre-metallization;
- (b) contacting the scoured, organic substrate with an aqueous, pre-metallization solution including a tin salt and an inorganic acid; and
- (c) plating the pre-metallized, organic substrate with silver, which comprises:
 - (i) immersing the pre-metallized, organic substrate in an aqueous Na₄EDTA solution containing metallization bath;
 - (ii) subsequently adding an aqueous, silver salt solution to the metallization bath to effect deposition of a silver oxide on the organic substrate, wherein the silver salt solution further includes a complexing agent; and
 - (iii) adding a reducing agent to the metallization bath thereby effecting formation of metallic silver on the organic substrate.

Applicant submits that this amended claim is clearly distinguishable from the cited references individually or collectively. Of the three references *Arcilesi et al.* is the only reference that discloses the use of Na₂EDTA in any manner, and *Arcilesi et al.* discloses the use of Na₂EDTA only as a source of EDTA (H₄EDTA), by the inclusion of an excess of strong acid, (col. 5 line 54 to col. 6 line 17 and Examples 1, 3, 4, and 5) to remove reducible metals and residual tin constituents from the palladium activated surface (col. 3 lines 12-21) upon which a metal is deposited by electroless plating. Any residue of any EDTA containing

species is removed by washing prior to metallization (Examples 1, 3, 4, and 5). *Arscilesi et al.* does not teach metallization in the presence of Na₂EDTA.

Hence, the acidic EDTA solutions of *Arscilesi et al.* would not motivate one of ordinary skill in the art to include an EDTA solution in a metallization bath. There is no disclosure in *Arscilesi et al.* or in combination with *Gabara et al.* to suggest the metallization in the presence of Na₂EDTA as recited in amended claim 1. *Sanders et al.* is relied upon to teach the scouring step and relies on the use of a basic surfactant which is contrary to the present invention as recited in claim 13 and as disclosed in the specification for the scouring step where surfactants are omitted in all steps of the method. *Sanders et al.* does not teach or suggest the use of an EDTA solution. Applicant respectfully requests the allowance of amended claim 1 and claims 2, 6-13.

7. The Examiner rejected claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Gabara et al.* in view of *Arscilesi et al.* and *Sanders et al.* and in further view of United States Patent No. 4,312,913 to *Rheaume*. *Rheaume* discloses the use of metallized yarns and weaving them together.

Claim 3 has been amended for clarity and claims use of an organic substrate in the form of a textile woven from fibers upon which the silver is deposited. Claim 3 does not recite a step of weaving metallized yarns to achieve a metallized woven textile, as taught in *Rheaume*. The method of *Rheaume* differs significantly from the present invention and

necessarily results in a different structure than that of the present invention. The textile of *Rheaume* can have touching metal surfaces where metal surfaces touch at the inside of the crossing yarns placed in contact by the weaving process, but these would be two distinct non-continuous metal surfaces. The present invention is directed to deposition of a metal on a woven textile as the substrate and inherently results in one continuous metal surface over the entire textile surface, but no metal would reside between the points where the yarns of the textile touched during metallization. Hence, one of ordinary skill in the art would not be motivated to metallize a textile because of knowledge of the disclosure of *Rheaume* to weave a metallized yarn in combination with *Gabara et al.*, *Arsiclesi et al.*, and *Sanders et al.*, which teach metallization of a substrate but do not teach or suggest a textile substrate for metallization or the metallization method of the present invention. Therefore, applicant respectfully requests withdrawal of the rejection of claim 3.

8. The Examiner rejected claims 1, 2 and 6-13 under 35 U.S.C. §103(a) as being unpatentable over *Gabara et al.* in view of *Arsiclesi et al.* and *Sanders et al.* and in further view of either United States Patent No. 3,960,573 to *Zeblysky* or Japan 63-278596. The Examiner stated:

"Referring to claim 1, Gabara et al. discloses a method for coating an organic substrate such as aramide fibers with metal. (column 2, lines 5-20), which can include cleaning (preparing) the fibers before treatment (column 6, lines 20-30). Gabara et al. then teaches etching the fibers by placing them in a sulfuric acid solution (column 3, line 35 through column 4, line 15). To coat the fibers with silver, they can then be sensitized by placing in a solution comprising stannous chloride and inorganic HCl acid (column 5, lines 1-10),

then the substrate was placed in a silver salt solution which inherently deposits silver oxide on the organic substrate as no reducing agent is present and the solution further includes ammonium hydroxide as a complexing agent (column 5, lines 1-20 and column 8, lines 40-65), the solution then has a reducing agent added which acts to reduce the silver oxide to metallic silver (column 5, lines 1-20 and column 8, lines 39-61).

(1) Gabara et al. does not disclose contacting the pre-metallized organic substrate with an aqueous Na₄EDTA solution prior to placing the substrate into the electroless silver bath. Gabara does disclose that the fibers are first immersed in a aqueous sensitizing solution such as tin chloride/HCl (column 5, lines 5-10). Zeblisky teaches that sensitizing solutions applied to plastic before silver electroless plating are will known to commonly include tin chloride/HCl and palladium (column 2, line 65 through column 3, line 15, column 3 line 65 through column 4, line 5, example 1, and column 11, line 20-25). '506 teaches that when preparing an organic fiber for silver electroless plating, the fiber can first be treated with solutions of tin chloride/HCl and palladium chloride/HCl thus exposing the fiber to both tin and palladium (see the abstract).

Accordingly, it would be obvious to anyone skilled in the art at the time the invention was made to modify Gabara et al. to further use palladium as well as tin to sensitize the substrate to prepare for silver plating as suggested by EITHER Zeblisky OR '506 with an expectation that this will provide a desirable sensitizing of the substrate for silver plating. Moreover, Arscilesi et al. discloses that an aqueous Na₄EDTA solution treatment prior to electroless plating plastic substrates and after etching and sensitization in a stannous chloride/palladium solution acts to accelerate the deposition during the electroless process and make the substrate more receptive to electroless plating, such as by complexing substantially all of any contaminating reducible metal. ions present and extracting any residual. tin constituents on the surface of the activated substrate (abstract, column 3 lines 6-45, example 1) and also preventing oxidation of the palladium constituent on the substrate (column 4, lines 50-65). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gabara et al. and EITHER Zeblisky OR '506 to include an acceleration and complexing step using aqueous Na₄EDTA solution as taught by Arscilesi et al. with the expectation that this step will accelerate the electroless deposition and make the substrate more receptive to the plating process by treating both the tin and palladium constituents on the surface."

Applicant respectfully disagrees with the Examiners characterization of the present invention. The present invention does not require palladium deposition for sensitization of the substrate as does *Arsiclesi et al.* and *Zeblicky* or '506. The word palladium is not used or inferred in the present application whereas, as correctly pointed out by the Examiner, *Arsiclesi et al.*, *Zeblicky*, and '506 all require palladium. The reason *Arsiclesi et al.* employs an aqueous Na₄EDTA solution is to remove inhibiting metals including tin from the activated palladium surface. Therefore, it can not be obvious to "include an acceleration and complexing step using aqueous Na₂EDTA solution as taught by Arcilesi et al. with an expectation that this step will accelerate the electroless deposition and make the substrate more receptive to the plating process by treating **both the tin and palladium** (bold added) constituents on the surface". The surface of the sensitized substrate of the present invention does not require both tin and palladium constituents, only a tin constituent. Rather, claim 1, although it does not require that palladium be absent, does not require, encourage, or suggest the presence of palladium on the activated surface. Rather than encouraging the use of the alkyl amine in acidic solution with a tin activated surface, *Arsiclesi et al.* can be considered to teach away from activation of a surface that requires tin but not palladium by an "aqueous Na₄EDTA solution". The alkamine of *Arsiclesi et al.* is used "to extract any residual tin constituents present on the surface of the activated substrate" (*Arsiclesi et al.* col. 3 lines 15-21), one would not be motivated to remove the tin that is required to achieve the tin activated surface of the present invention. *Zeblicky* or '506 requires palladium and can not teach a

system that does not require palladium. Particularly, as in amended claim 1, these references do not teach or suggest the inclusion of a Na₄EDTA solution in the presence of the silver salt solution. Therefore, the applicant respectfully requests that the Examiner withdraw the rejections and allow claims 1, 2, and 6-13.

9. The Examiner rejected claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Gabara et al.* in view of *Arsiclesi et al., Sanders et al., Zeblicky* or Japan 63-278596 and in further view of *Rheame*.

As argued above under section 7, the method of amended claim 3 does not include a step of weaving a metallized yarn or fiber, rather the substrate to be metallized can be a woven textile. As such, *Rheame* does not render the claimed invention obvious because of its inclusion of a weaving step of a metallized fiber. Furthermore, the present invention does not require the use of palladium as does *Arsiclesi et al., Zeblicky* or Japan 63-278596 as argued above. Therefore, the Applicant respectfully requests allowance of amended claim 3.

CONCLUSION

For at least the reasons given above, claims 1-3 and 6-13 define patentable subject matter and are thus allowable. Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance; the Examiner is

respectfully requested to contact the undersigned representative at the telephone number listed below.

No fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 50-0951.

Respectfully submitted,



Mark A. Buese, Ph.D.
Reg. No. 52,669
AKERMAN SENTERFITT
222 Lakeview Avenue
Suite 400
West Palm Beach, Florida 33401-6183
(561) 653-5000

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